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(54) Process and composition for treating fabrics.

(57) A process and composition for the domestic treatment of a fabric to reduce the amount of dy released from the fabric during wet treatments comprising the steps of contacting the fabric with a solution of the composition comprising a cationic dye fixing agent wherein the temperature of the solution is below 40°C throughout the process.

The invention has the advantage that dye transfer between coloured and white or coloured and coloured fabrics during wet treatments such as laundering is reduced.

EP 0 462 806 A2

This invention relates to a process and composition for treating fabrics to reduce th amount of dye released from coloured fabrics during w t treatments such as washing and rinsing processes.

In th field of industrial textile aftertreatment it is known to treat dyed or printed fabrics with dye "fixing" agents. Dye fixing ag nts generally act in one of two ways either (i) as soaping aids to assist in the removal of loosely held dye from the fabric so that the remaining strongly held dye is relatively fast to subsequent wet treatments or (ii) as binding agents which assist in binding the loosely held dye to the fabric and thus improving the fastness of the dye to subsequent wet treatments.

The present invention is concerned with the second (binding) type of dye fixing agent.

Under domestic conditions when mixed coloured fabrics and mixed loads of coloured and white fabrics are subjected to wet treatments such as the washing and rinsing steps of a laundering process there is a risk of dye transfer through the treatment liquor from one fabric to another, sometimes in spite of the fact that an industrial aftertreatment may have been applied. The dye transfer can result in the bleeding and fading of colours, discoloration and/or staining of the fabrics and is clearly undesirable. With fashion moving towards more coloured clothing and textile materials, especially multi-coloureds, the problem of dye transfer during wet treatments has become more acute.

Various proposals have been made in the art to resolve this problem, but in the main these solutions r ly on bleaching or rendering ineffective the dye once it has entered the wash or rinse solution. For example GB 1 368 400 (Procter & Gamble) EP 0 024 368 (Unilever) and EP 0 265 257 (Unilever).

The present invention seeks to provide a process and a composition which reduce the amount of dy released from coloured fabrics during wet treatments wherein the drawbacks of the art are mitigated to a substantial degree.

Dye fixing agents when applied as an industrial treatment are generally either exhausted from a heated liquor comprising the fixing agent at specified level, salt to give an optimum ionic strength and pH adjusters to maintain the pH at low level or padded through the fabric using the heated liquor previously described. It is generally believed that liquor temperatures above 40°C are necessary to effect treatment. Thus in Sandoz technical literature on INDOSOL E-50 Liquid (27.02.84 Ref 6008.35.84), a cationic dye fixing agent, the treatment liquor is heated for 20-30 minutes at temperatures between 50 and 60°C to effect exhaustion.

Similarly in Crosfield Textile Chemicals literature on CROSCOLOR PMF (July 1981 Code No 7894) and CROSCOLOR NOFF (January 1988 Code No. 8544), both cationic dye fixing agents, exhaustion temperatur s of 50°C for 20 minutes and 40°C for 20-25 minutes respectively are disclosed. It follows then that there is a prejudice in the industrial after-treatment field to process temperatures below 40°C.

It is also generally believed that a high dye fixing agent concentration in the liquor is necessary to effect exhaustion. In Crosfield Textile Chemicals literature on CROSCOLOR PMF 10% on weight of goods is suggested.

It has now surprisingly been found that dye fixing agents may be exhausted onto fabrics as part of a domestic treatment process at temperatures below 40°C at generally lower levels than used industrially and that such a process may reduce the amount of dye released from coloured fabrics during wet treatments such as domestic laundering.

Accordingly, the invention provides a process for the domestic treatment of a fabric to reduce the amount of dye released from the fabric during wet treatments comprising the steps of contacting the fabric with a solution of a composition comprising a cationic dye fixing agent wherein the temperature of the solution is below 40°C throughout the process.

The fact that a dye fixing effect is seen from a domestic process using dye fixing agents normally associated with industrial processes is truly surprising since in a domestic process pH, ionic strength and water hardness are not easily controlled.

The process may be carried out as part of a domestic laundering process i.e. as part of the wash step or as part of the rinse step, or as a separate treatment.

It has been found that detergent active materials when added to the composition of the invention may enhance the effect of the dye fixing agent so that a substantial reduction in the amount of dye released from treat d fabrics in subsequent wet treatments is seen. This is unexpected since the industrial literature teaches that a certain ionic strength in the treatment solution is needed to prevent excessive dye release. Thus it is particularly advantageous to incorporate the dye fixing agent in a nonionic bas d detergent powder or liquid which can then be used in the process of the invention.

Accordingly, the present inventi n pr vides a composition comprising:

i. a cationic dye fixing agent
ii. a detergent active, pref rably nonionic and ptionally

iii. a fabric softening compound.

The dye fixing agents suitable f r use in the process of the invention are cationic sp ci s for example Indosol E-50, an aliphatic polyamine, x Sandoz and Croscolor NOFF a dimethyldiallyl ammonium chloride polymer of molecular weight in the range 2,000 to 20,000 ex Crosfield. Oth r cationic dy fixing agents are described in "Aftertreatments for Improving th Fastness of Dyes on Textil Fibres" by Christoph r C Cook (REV. PROG. COLORATION VOL 12 1982). Dye fixing agents suitable for use in the present invention are ammonium compounds such as fatty acid - diamine condensates e.g. the hydrochloride, acetate, methosulphate and benzyl hydrochloride of oleyldiethyl aminoethylamide, oleylmethyl- diethylenediaminemethsulphat , monostearyl-ethylene diaminotrimethylammonium methosulphate and oxidised products of tertiary amines; derivatives of polymeric alkyldiamines, polyamine-cyanuric chloride condensates and aminated glycerol dichlorohydrins.

The amount of dye fixing agent to be employed in the composition of the invention is preferably from 0.01% to 50% by weight of the composition, more preferably from 1% to 25% by weight, most preferably from 5% to 20% by weight.

It has been found that the process of the invention is particularly convenient when carried out as part of the rinse step of the laundering process, the temperature of the rinse water generally being between 5°C and 25°C, the dye fixing agent being part of a composition comprising ingredients normally associated with rins conditioners.

The compositions according to the invention contain one or more detergent active materials, selected from soaps, non-soap anionic, nonionic, zwitterionic and amphoteric synthetic detergent active materials, cationic, nonionic, zwitterionic and amphoteric fabric softening materials and optionally one or more fabric softening materials. Nonionic materials are especially useful in the context of the present invention.

Many suitable detergent compounds are commercially available and are fully described in the literatur , for example in "Surface Active Agents and Detergents", Volumes I and II, by Shwartz, Perry and Berch.

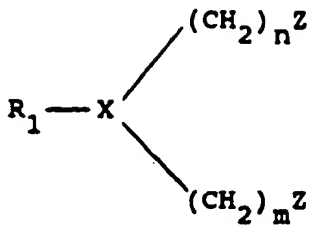
Suitable nonionic compounds which may be used include in particular the reaction products of compounds having a hydrophobic group and a reactive hydrogen atom, for example aliphatic alcohols, acids, amid s or alkyl phenols with alkylene oxides, especially ethylene oxide either alone or with propylene oxide. Specific nonionic detergent compounds are alkyl (C_6-C_{22}) phenols-ethylene oxide condensates, generally up to 25 EO, i.e. up to 25 units of ethylene oxide per molecule, the condensation products of aliphatic (C_8-C_{18}) primary or secondary linear or branched alcohols with ethylene oxide, generally up to 40 EO, and products made by condensation of ethylene oxide with the reaction products of propylene oxide and ethylenediamine. Other so-called nonionic detergent compounds include alkyl polyglycosides, long tertiary amine oxides, long chain tertiary phosphine oxides and dialkyl sulphoxides.

Amounts of amphoteric or zwitterionic detergent compounds can also be used in the compositions of the invention but this is not normally desired due to their relatively high cost. If any amphoteric or zwitterionic detergent compounds are used it is generally in small amounts.

Suitable fabric softening compounds may for instance be selected from cationic fabric softening materials, nonionic fabric softening materials. Suitable materials include substantially water-insoluble quaternary ammonium compounds such as for instance disclosed in EP 89200545.5 and EP 239 910, amine mat rials, amphoteric fabric conditioning materials as disclosed in EP 89200545.5, clays, polysiloxanes as disclosed in EP 150 867 (Procter and Gamble Co.) and nonionic cellulose ethers as disclosed in EP 213 730 (Unilev r).

The effective amount of the detergent active or fabric softening compound or compounds used in the composition of the present invention is generally in the range of up to 50%, preferably up to 40% by w ight, most preferably not more than 30% by weight of the composition. Preferably the level is between 1% and 50%, more preferably between 2% and 30%.

Detergency compositions of the invention may include detergency builder to improve the efficiency of the detergent active, in particular to remove calcium hardness ions from the water and to provide alkalinity. Th builder material may be selected from inorganic precipitating builders materials (such as alkali metal carbonates, bicarbonates, borates, orthophosphates and silicates), sequestering builder materials (such as alkali metal pyrophosphates, polyphosphates, amino polyacetates, phytates, polyphosphonates, aminopolymethylene phosphonates and polycarboxylates), ion-exchange builder materials (such as zeolites and amorphous alumino-silicates), organic precipitating builder materials (such as those having the formula (I):



wherein: R_1 is C_{10}-C_{24} alkyl or alkenyl, or an arylalkyl or alkylaryl group of equivalent chain length; X is CH, CR_2, N or CON; R_2 is C_1-C_3 alkyl; Z is COOY or SO_3Y; Y is hydrogen or a solubilising cation, preferably alkali metal and especially sodium; and n and m, which may be the same or different, are O or integers from 1 to 4, or mixtures of any one or more of these materials. Preferred examples of builder materials include sodium tripolyphosphate, mixtures thereof with sodium orthophosphate, sodium carbonate, mixtures thereof with calcite as a seed crystal, sodium citrate, zeolite and the sodium salt of nitrili- triacetic acid.

The level of such builder material in the compositions of the invention may be up to 80% by weight, preferably from 20% to 70% by weight and most preferably from 30% to 60% by weight.

Detergent compositions according to the invention preferably are alkaline, in that they yield a pH of more than 8.0 when added to water at a concentration of 1% by weight at 25°C.

Apart from the components already mentioned, a detergent composition of the invention can contain any of the conventional additives in the amount in which such additives are normally employed in fabric washing detergent compositions. Examples of these additives include additional fabric softening agents. We have found particularly beneficial effects when the fabric softening agent is a mixture of organic precipitating builder and either a cationic fabric softening agent or a fatty amine. Other optional additives include the lather boosters such as alkanolamides, particularly the monoethanolamides derivatives from palm kernel fatty acids and coconut fatty acids, lather depressants, oxygen-releasing bleaching agents such as sodium perborate and sodium percarbonate, peracid bleach precursors, chlorine-releasing bleaching agents such as tricloroisocyanuric acid, inorganic salts such as sodium sulphate, and, usually present in very minor amounts, fluorescent agents, perfumes including deodorant perfumes, enzymes such as cellulases, proteases and amylases, germicides and colourants.

The compositions may be in any convenient form such as bars, powders, pastes or liquids which may b aqueous or non-aqueous and structured or unstructured.

The detergent compositions may be prepared in any way appropriate to their physical form such as by dry-mixing the components, co-agglomerating them or dispersing them in a liquid carrier. The fabric softening agent may be incorporated as such or it may be incorporated in the form of particles. The dye fixing agent may be incorporated in liquid or solid form.

Compositions of the present invention which are specifically suitable for use in the rinse preferably comprise from 1 to 70% of a fabric softening compound.

For use in the rinse cycle of the fabric laundry process, compositions of the present invention are preferably liquid and comprise an aqueous base, which may constitute from 5 to 97% by weight of the composition.

The pH of fabric softening compositions for use in the rinse is preferably less than 8.0 when added to water at a concentration of 1% by weight of the composition.

The invention will now be illustrated in the following non-limiting examples.

EXAMPLES

Example 1

Dye fixing agents Indosol E-50 ex Sandox and Croscolor NOFF ex Crosfields Textile Chemicals were separately applied to cloths dyed (and unfixed) with a range of dyes. The application took place from a range of solutions at 20°C and 40°C and in each cas both coloured and white cloths were present to assess the dye transfer taking place during the treatment process. Colour changes were measured as CIELAB Δ E values for DG5 illumination and 10° observer.

The treatments were as follows.

A. The cloths w re immers d in a solution f 0.05% by weight of fixing ag nt and a 0.25% by weight dispersion of Arquad 2HT a fabric soften r at 20°C f r 15 minutes.

B. The cloths were immersed in th solution of A above at 40°C for 15 minutes.

C. The cloths were immersed in a solution of 0.05% by weight of fixing agent and 0.05g/l of Synperonic A7 ex ICI, a nonionic detergent active at 20°C for 15 minutes.

D. The cloths were immersed in the solution of C at 40°C for 15 minutes.

The cloths used in Examples 1 and 2 were as follows:

Cloth 1 Cloth dyed with Direct Green 26
Cloth 2 White monitor treated along with Direct Green Cloth
Cloth 3 Cloth dyed with Direct Blue 25
Cloth 4 White Monitor treated along with Direct Blue cloth
Cloth 5 Cloth Dyed with Direct Red 80
Cloth 6 White Monitor treated along with Direct Red cloth

The results are presented in Table 1.

These results show that generally less dye transfer takes place during the process of the invention when the temperature of the solution is below 40°C. For example the ΔE values for treatment A are generally lower than those for treatment B (which is at the higher temperature) indicating that less dye transfer has taken place. This is also true for treatment C compared with treatment D at the higher temperature.

TABLE 1

ΔE

Treatment	Cloth 1	Cloth 2	Cloth 3	Cloth 4	Cloth 5	Cloth 6
A						
Indosol E-50	1.44	1.39	1.06	1.69	1.39	2.51
Croscolour NOFF	1.76	0.86	1.59	1.35	1.17	2.33
B						
Indosol E50	2.60	1.58	1.25	2.52	1.76	4.34
Croscolour NOFF	2.75	1.29	1.06	2.68	1.89	3.94

Treatment	Cloth 1	Cloth 2	Cloth 3	Cloth 4	Cloth 5	Cloth 6
C						
Indosol E50	0.66	1.98	0.90	2.32	2.20	5.12
Croscolour NOFF	1.18	1.64	1.15	2.19	2.73	3.95
D						
Indosol E50	1.47	3.89	0.90	4.26	2.82	6.36
Croscolour NOFF	1.88	3.67	1.38	4.73	4.78	8.45

Example 2

The treated coloured cloths and treated white monitors w re washed together in a detergent composition at 40°C f r 15 minutes with clean whit monitors. A control exp riment was also carried out using untr ated coloured cloths and clean monitors.

The detergent composition in parts by weight was as follows:

Linear alkyl sulphate	6
Ethoxylated nonionic 7EO	4.5
Ethoxylated nonionic 3EO	3.5
Soap (anhydrous)	0.27
Fatty ACid C_{16} - C_{18}	0.3
Sodium silicate (alkaline)	6
Sodium tripolyphate	25
Sodium carbonate	5
Sodium carboxymethyl Cellulose	0.32
Acrylic/Maleic Copolymer	0.5
Sodium ethylenediamine tetra acetic acid	0.13
Sodium sulphate	26
Water and minors	7.96

The results of ΔE measurements on the white monitors treated (Cloths 2, 4 and 6 from example 1) and untreated are as follows:

ΔE (after washing, no additional dye fixing agent added to wash)

	Indosol E-50	Croscolour NOFF
Treatment A		
Control	19.30	19.30
Cloth 2	15.00	17.09
Untreated White Monitor	12.97	16.59
Control	21.55	21.55
Cloth 4	13.73	16.70
Untreated White Monitor	12.33	15.70
Control	12.02	12.02
Cloth 6	5.58	7.21
Untreated White Monitor	5.49	6.85
Treatment B (comparative)		
Control	19.30	19.30
Cloth 2	16.38	18.15
Untreated White Monitor	15.15	17.30

	ΔE (after washing, no additional dy fixing agent added to wash)	
	Indosol E-50	Croscolour NOFF
Treatment C		
Control	19.30	19.30
Cloth 2	4.11	8.24
Untreated White Monitor	2.88	7.17
Control	21.55	21.55
Cloth 4	12.85	15.93
Untreated White Monitor	11.08	14.48
Control	12.02	12.02
Cloth 6	6.98	7.85
Untreated White Monitor	5.97	6.57
Treatment D (comparative)		
Control	19.30	19.30
Cloth 2	7.91	13.46
Untreated White Monitor	6.18	12.06

These results show that the process of the invention reduces the amount of dye released from coloured fabrics during wet treatments such as washing. This can be seen in any of the Δ E values under treatment A or C where less dye transfer has occurred to cloths washed with dye fixed coloured fabrics than with the control fabrics.

Comparison of cloths washed under treatment B (40°C) with those under treatment A (20°C) or treatment D (40°C) with those under treatment C (20°C) shows that better dy transfer inhibition is btained at the lower process temperature of th invention.

TABLE 1

E

Treatment	Cloth 1	Cloth 2	Cloth 3	Cloth 4	Cloth 5	Cloth 6
A						
Indosol E-50	1.44	1.39	1.06	1.69	1.39	2.51
Croscolour NOFF	1.76	0.86	1.59	1.35	1.17	2.33
B						
Insodol E50	2.60	1.58	1.25	2.52	1.76	4.34
Croscolour NOFF	2.75	1.29	1.06	2.68	1.89	3.94

Example 3

Liquid fabric treatment compositions according to the invention suitable for use in th rinse cycle of a domestic washing machine are as follows:

	A	B
HTTMAPC[1]	5.8	35.0
Hardened tallow fatty acid	0.95	5.7
Genapol T-150[2]	0.05	0.3
Indosol E50	5	30.0
Perfume	0.15	0.9
Water and minors	Balance	Balance
	100	100

1. 1,2-dihardened tallow oxy trimethyl ammonium propane chloride (ex Hoechst).

2. Tallow alcohol ethoxylated with 15 moles of ethylene oxide ex Shell.

Claims

1. A process for the domestic treatment of a fabric to reduce the amount of dye released from the fabric during wet treatments comprising the steps of contacting th fabric with a solution of a composition comprising a cationic dye fixing ag nt wherein the temperature of the solution is b low 40°C throughout the process.

2. A process as claimed in claim 1 wherein the temperature of the solution is between 5°C and 25°C throughout the process.

3. A process as claimed in any preceding claim wherein the composition comprises from 0.01 to 50% by weight of the cationic dye fixing agent.

4. A process as claimed in any preceding claim wherein the process is carried out as part of the rinse step of a laundering process.

5. A composition for the domestic treatment of a fabric to reduce the amount of dye released from the fabric during wet treatments comprising:
   i. a cationic dye fixing agent and
   ii. a detergent active.

6. A composition as claimed in claim 5 wherein the detergent active is a nonionic detergent active.

7. A composition as claimed in claim 5 or claim 6 wherein the composition additionally comprises a fabric softening compound.

8. A detergent composition for the domestic treatment of a fabric to reduce the amount of dye released from the fabric during wet treatments comprising:
   i. from 0.01 to 50% by weight of a cationic dye fixing agent and
   ii. from 1 to 50% by weight of a nonionic detergent active.

9. A liquid fabric treatment composition for the domestic treatment of a fabric to reduce the amount of dye released from the fabric during wet treatments comprising:
   i. from 0.01 to 50% by weight of a cationic dye fixing agent;
   ii. from 1 to 50% by weight of a nonionic detergent active; and
   iii. from 1 to 50% by weight of a fabric softening compound.

10. A liquid fabric treatment composition as claimed in claim 9 wherein the liquid composition comprises an aqueous base.